CLAIM(S):

1. An interferometer for disc surface inspection, comprising:

a laser configured to provide a linearly polarized laser beam;

a variable ratio beam splitter positioned to receive the linearly polarized laser beam and configured to split the linearly polarized laser beam into a reference beam and an object beam, the reference beam and the object beam being polarized beams with polarizations orthogonal to one another;

a mirror positioned to reflect the reference beam back toward the variable ratio beam splitter to provide a reflected reference beam;

the disc surface positioned to reflect of the object beam back toward the variable ratio beam splitter to provide a reflected object beam;

the variable ratio beam splitter positioned to receive the reflected reference beam and the reflected object beam and configured to combine the reflected reference beam and the reflected object beam to provide a combinative beam;

a non-polarizing beam splitter positioned to receive the combinative beam and configured to split the combinative beam into a first output beam and a second output beam;

an adjustable quarter-wave plate positioned to receive the first output beam and configured to introduce a phase shift between the reflected object beam portion of the first output beam and the reflected reference beam portion of the first output beam to provide a phase-shifted output beam;

a first polarizer positioned to receive the phase-shifted output beam and configured to assemble the phase-shifted output beam along a predetermined direction to provided a first assembled beam;

a second polarizer positioned to receive the second output beam and configured to assemble the second output beam along the predetermined direction to provide a second assembled beam;

a first optical detector positioned to receive the first assembled beam and configured to provide a first voltage proportional to change in intensity due to interference of the reflected object beam portion and the reflected reference beam portion of the first assembled beam; and

a second optical detector positioned to receive the second assembled beam and configured to provide a second voltage proportional to change in intensity due to interference of the reflected object beam portion and the reflected reference beam portion of the second assembled beam.

2. The interferometer of claim 1 wherein the variable ration beam splitter comprises:

a half-wave plate configured to receive the linearly polarized laser beam; and

a polarizing beam splitter configured to receive the linearly polarized laser beam from the half-wave plate.

3. The interferometer of claim 2 wherein the half-wave plate is configured for rotation for balancing relative intensity of the reference beam and of the object beam.

4. The interferometer of claim 1 further comprising a lens positioned to receive the object beam and configured to reduce spot size of the object beam.

5. The interferometer of claim 4 further comprising:

a first quarter-wave plate positioned to receive the reflected reference beam; and

a second quarter-wave plate positioned to receive the reflected object beam.

6. The interferometer of claim 1 wherein the phase shift is approximately equal to ninety degrees.

7. The interferometer of claim 1 wherein the first optical detector and the second optical detector are coupled to an information processing system which is coupled to receive the first voltage and the second voltage, the information processing system configured to provide a display output of temporal variations in light intensity in parallel

and in phase quadrature of the first assembled beam and the second assembled beam.

8. The interferometer of claim 1 wherein the first optical detector and the second optical detector are coupled to an information processing system which is coupled to receive the first voltage and the second voltage, the information processing system configured to provide a display output of temporal interference fringes formed by temporal phase difference of the first assembled beam and the second assembled beam.

9. The interferometer of claim 1 wherein the first optical detector and the second optical detector are coupled to an information processing system which is coupled to receive the first voltage and the second voltage, the information processing system configured to determine intensity of the first assembled beam and the second assembled beam as a function of phase angle, to unwrap the phase angles and to determine displacement.

10. The interferometer of claim 9 wherein the intensity for the first assembled beam is determinable as, $I = Ia + Ib \cos(\varnothing)$, where $\varnothing$ is phase of the first assembled beam, $Ia = (Imax + Imin)/2$ and $Ib = (Imax - Imin)/2$ and where $Imax$ and $Imin$ are the maximum and minimum intensities of the first assembled beam, wherein the intensity for the second assembled beam is determinable as, $Q = Qa - Qb \sin(\varnothing)$, where $\varnothing$ is phase angle of the second assembled beam, $Qa = (Qmax + Qmin)/2$ and $Qb = (Qmax - Qmin)/2$ and where $Qmax$ and $Qmin$ are the maximum and minimum intensities of the second assembled beam, and wherein the phase angle for the first assembled beam for wrapped phase is determinable as, $\varnothing = \cos\text{-}1[(I\text{-}Ia)/Ib]$ for Q-Qa0 and $\varnothing = 2n - \cos\text{-}1[(I\text{-}Ia)/Ib]$ for $Q\text{-}Qa>0$, and wherein the phase angle for the second assembled beam for wrapped phase is determinable as, $\varnothing = \sin\text{-}1[(Qa\text{-}Q)/Qb]$ for I-Ia0 and Q-Qa0, $\varnothing = n - \sin\text{-}1[(Qa\text{-}Q)/Qb]$ for $I\text{-}Ia<0$ and $\varnothing = 2n + \sin\text{-}1[(Qa\text{-}Q)/Qb]$ for I-Ia0 and $Q\text{-}Qa>0$.

11. The interferometer of claim 10 wherein the processor system is configured to provided a weighted average phase angle of the phase angle of the first assembled beam and the phase angle of the second assembled beam, and wherein the weighted average phase angle is combined with positive and negative values of a constant according to direction of slope to provide a continuous phase function to determine the displacement.

12. A method for media surface inspection, comprising:

providing a linearly polarized laser beam;

polarized splitting of the linearly polarized laser beam into a reference beam and an object beam;

reflecting the reference beam from a mirrored surface to provide a reflected reference beam;

reflecting the object beam from the media surface to provide a reflected object beam;

combining the reflected reference beam and the reflected object beam to provide a combinative beam;

amplitude splitting of the combinative beam into a first output beam and a second output beam;

introducing a phase-shift between the reflected object beam portion and the reflected reference beam portion of the first output beam to provide a phase-shifted output beam;

assembling the phase-shifted output beam at an angle to direction of polarization to provide a first assembled beam;

assembling the second output beam at the angle to provide a second assembled beam;

detecting fringes of the first assembled beam to provide a first voltage; and

detecting fringes of the second assembled beam to provide a second voltage.

13. The method of claim 11 further comprising:

balancing intensity to provide the reference beam and the object beam;

determining temporal variations in intensity from the first voltage and the second voltage; and

displaying in parallel and in quadrature the first assembled beam and the second assembled beam.

14. A signal-bearing medium containing a program which, when executed by a processor in response to inspection of a disc medium surface, causes execution of a method comprising:

determining a first intensity for a first beam voltage;

determining a second intensity for a second beam voltage;

determining a first phase angle for the first intensity;

determining a second phase angle for the second intensity;

determining a weighted average from the first phase angle and the second phase angle;

adding positive and negative values of a constant in response to slope direction of the weighted average to provide a phase function; and

determining displacement caused by variations in the disc media surface.

15. A signal-bearing medium containing a program which, when executed by a processor in response to inspection of a disc medium surface, causes execution of a method comprising:

determining a first intensity for a first beam voltage;

determining a second intensity for a second beam voltage;

determining a first phase angle for the first intensity;

determining a second phase angle for the second intensity;

adding positive and negative values of a constant to the first phase angle and the second phase angle in response to slope direction of the first phase angle and the second phase angle to provide a phase function; and

determining displacement caused by variations in the disc media surface.

16. An interferometer for disc surface inspection, comprising:

a laser configured to provide a linearly polarized laser beam;

a variable ratio beam splitter positioned to receive the linearly polarized laser beam and configured to split the linearly polarized laser beam into a reference beam and an object beam, the reference beam and the object beam being polarized beams with polarizations orthogonal to one another;

a mirror positioned to reflect the reference beam back toward the variable ratio beam splitter to provide a reflected reference beam;

the disc surface positioned to reflect of the object beam back toward the variable ratio beam splitter to provide a reflected object beam;

the variable ratio beam splitter positioned to receive the reflected reference beam and the reflected object beam and configured to combine the reflected reference beam and the reflected object beam to provide a combinative beam;

a non-polarizing beam splitter positioned to receive the combinative beam and configured to split the combinative beam into a first output beam and a second output beam;

an adjustable quarter-wave plate positioned to receive the first output beam and configured to introduce a phase shift between the reflected object beam portion of the first output beam and the reflected reference beam portion of the first output beam to provide a phase-shifted output beam;

a first polarizer positioned to receive the phase-shifted output beam and configured to assemble the reflected object beam portion and the reflected reference beam portion components of the phase-shifted output beam along a direction to provided a first assembled beam;

a second polarizer positioned to receive the second output beam and configured to assemble the reflected object beam portion and the reflected reference beam portion components of the second output beam along a direction to provide a second assembled beam;

a first optical detector positioned to receive the first assembled beam and configured to provide a first voltage proportional to fringes due to interference of the reflected object beam portion and the reflected reference beam portion of the first assembled beam; and

a second optical detector positioned to receive the second assembled beam and configured to provide a second voltage proportional to fringes due to interference of the reflected object beam portion and the reflected reference beam portion of the second assembled beam.

17. The interferometer of claim 15 wherein the direction is approximately forty-five degrees.

18. An interferometer comprising:

means for providing a first beam having interfering measurement and reference beam components; and

means for providing a second beam, out-of-phase with respect to the first beam, having the measurement and reference beam components.

19. The interferometer of claim 17 further comprising means for receiving the first beam and the second beam and for converting the first beam and the second beam to respective proportional voltages.

20. The interferometer of claim 18 further comprising means for processing the proportional voltages to determine displacement.